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ABSTRACT

Two predictions related to educational performance are examined in this experiment: (1) Competitive treatments increase classroom performance and interest on a power test; and (2) game-like competition is as effective as reward competition in increasing classroom performance and interest on a power test. 1,035 fifth and sixth graders from 36 classes in four Wisconsin school systems participated in the research and were randomly assigned to either a control group (competition with reward treatment), or an experimental group (competition in a game setting treatment). Forms 4A and 4B of the mathematical subtest of School and College Ability Tests were used to measure treatment effects. The competitive treatments had no significant effect on performance but significantly increased the childrens' interest in the test. There was no difference between the two significant treatments; competition with a game was as effective as competition with a reward for both performance and interest measures. The speculation is made that the relative magnitude of the performance and interest effect is directly related to the nature of the task. That is, competition increases performance more in a speed task than in a power task; and competition increases interest more in a power task than in a speed task. (Author/RSM)

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EFFECTS OF EMPHASIZING COMPETITION IN CLASSROOM-TESTING PROCEDURES

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The presence of competition in our educational system is hardly a topic for debate; whether that element should be emphasized or de-phasized is the controversial topic which has led to years of experimenting in the laboratory as well as the classroom. Task performance has been the primary dependent variable; the measure is usually of the nature of a speed test as opposed to a power test, particularly when children are used as Ss. Paper-cutting, dot-making, rubber-stamp printing, cancellation, and substitution tasks are among the measures most frequently used to examine the effects of competitive motivation. Although such research demonstrates the effect of competition on children's performance, it does not necessarily reflect the value of using competitive motivation as an educational strategy. There are, however, experiments which, by nature of their task, seem to address themselves more directly to the educational implications of competition.

Hurlock (1927) found that fourth and sixth graders performed better on an addition task under a competitive treatment than under a control treatment. Maller's (1929) findings showed that children in grades five through eight worked more efficiently on

a simple addition task in a competitive treatment in which the individual was given credit for his own performance than in a treatment in which the individual's score simply enhanced the group mean. Chapman and Feder (1917), in comparing a competitive-oriented treatment with a control, found there was greater improvement in all of three different tasks when competition was emphasized. Furthermore, the difference between conditions was greater on a mathematics task than on a cancellation or digit symbol measure.

However supportive of educational competition these results may seem, it must be noted that the mathematics tasks used in the studies cited above were very simple and "...required speed and accuracy on the part of the child, rather than reasoning of the problem solving variety," (Hurlock, 1927, p. 281). Nevertheless, it seems that the effect of competition on power tests rather than speed tests would be the more relevant concern in education.

A second major consideration directly related to competitive motivation is the selection and use of incentives and reinforcements. Among the numerous learning studies which have demonstrated the significance of these variables are those which have examined the effects of game activities. Warden and Cohen (1931) found that the promise of playing a game was the most effective of five incentives (i.e., game, story, party, praise, blame). Humphrey (1967) found that the use of a game-like procedure significantly increased fourth graders' reading skills. Although neither of these experiments examined game effectiveness in a well-defined competitive situation, both used problem-solving tasks which,

in a classroom setting, usually create at least a competitive environment. Thus one might expect that a competitive treatment which is game-oriented would be at least as effective as a competitive treatment in which the highest achiever is given a small material reward.

This experiment, therefore, was designed to examine two major predictions related to educational competition:

1. Competitive treatments increase classroom performance on a power test.
2. Game-like competition is as effective as reward competition in increasing classroom performance on a power test.

In addition to task performance, S interest in the treatment was also measured. Predictions on the interest variable were similar to those stated for the performance measure. That is, interest is higher in the competitive treatments than in the control, and game competition is as effective as reward competition in arousing interest.

METHOD

Subjects

A total of 1,035 fifth and sixth grade students in 36 classrooms from four Wisconsin school systems participated in this research.[1] Mean class IQ's ranged from 106 to 127; the overall mean IQ was 112.

Measures

Forms 4A and 4B of the mathematical subtest of School and College Ability Tests (SCAT, Series II) were used to measure treatment effects. Each form has 50 computational items; for form 4A, used with fifth graders, the estimated K-R 20 reliability coefficient

is .90 and the standard deviation is 9.19. These forms are intended for use in grades four through six and the reported grade means are approximately 22, 29, and 36 respectively (ETS, 1967). A major difference between the use of these SCAT subtests in this experiment and the procedures specified in the administrator's handbook concerns timing. Since it was estimated that 59% of the fifth grade students will complete form 4A in the 20-minute time allowance (ETS, 1967), and since a pilot study indicated that several Ss finished as much as five to eight minutes early, Ss were asked to complete as much of both forms as they could in a total of twenty minutes. The number of correct responses over both subtests served as one dependent measure.

A second dependent measure was the Ss' interest rating on the task. They were asked to indicate whether they found it "dull and uninteresting," "kind of interesting," or "very interesting and lots of fun." Ss expressed their evaluation by writing 1, 2, or 3 respectively. Classrooms, rather than individuals, were used as the unit of observation in order that a typical setting and familiarity with competitors could be assured.

Procedure

Thus 18 fifth grade classrooms and 18 sixth grade classrooms were randomly assigned to one of three conditions as identified below:

Control--The S worked the task as a regular test under typical classroom testing conditions.

Competition with Reward--Each S was encouraged to surpass a small group of classmates (4-6), and was promised a package of candy Life-Savers for achieving the highest score in their subgroup. Math achievement scores and teacher evaluations were used in an attempt to maximize homogeneity within groups.

Competition in a Game Setting--Again each S was encouraged to surpass a small group of classmates, assumed to be of relatively equal ability. The S achieving the highest score in his subgroup was to be lead player in the game "Top or Tumble" which was promised as a culminating activity for the task. The nature of the game is as follows:

> After completion of a task in which students have been ability grouped, the high-scoring S (lead player) from each subgroup must in turn defend his "top" rank. From a deck of cards on which additional items (resembling those used in the task) are typed, E selects one and reads it aloud. The lead player is given twenty seconds to answer correctly. If he succeeds his initials are placed at the top of a score sheet. If he fails to answer correctly in the time allowed, three points are subtracted from his original score. As long as this adjusted score does not affect his rank within his subgroup, he is given another challenge card. A single correct answer enables him to defend his position and entitles him to be identified as "top" on the score sheet. However, if his score falls below that of any member in his subgroup, the original lead player "tumbles;" his initials are recorded at the bottom of the score sheet; and the new high-score S from the same subgroup is then given the opportunity to "top or tumble." Only one S from each subgroup can be identified as "top" player.

Data collection required about 35 minutes in each classroom and one E conducted the study. Instructions for the task were given and a chalkboard demonstration was used to insure understanding.

Immediately following the test Ss were directed to exchange papers; answer keys were distributed and papers were scored. These scores were used in awarding candy Life-Savers and determining the lead players in the game condition. (All papers were rechecked before the statistical analysis was performed.) In the control condition the scores simply served as immediate feedback for Ss. At the completion of the task Ss were asked to indicate, on a three-point scale, their interest rating.

Design and Analysis

A 2 X 3 randomized block design consisting of three treatments and two grade levels was used for this experiment. Since classrooms were the unit of observation, the 18 classrooms within each block were randomly assigned to one of the three conditions. A multivariate analysis program was selected to test the hypotheses on the two dependent measures (i.e., performance and interest). For each of these measures, two orthogonal planned comparisons were developed. The first was designed to test the difference between control and combined competitive treatments (C vs R and G); the second tested the difference between the two competitive treatments (R vs G). These same two planned comparisons were made on both the performance and interest measures; an $\alpha = .05$ was set for the tests.

RESULTS

The results were as follows: Contrary to predictions, the competitive treatments had no significant effect on performance. On the interest measure, however, the test between control and competitive treatments was significant beyond the .01 level;

S's preference for the competitive conditions was clearly reflected. Likewise, according to prediction there was no difference between the two competition treatments; competition with game was as effective as competition with reward for both the performance and interest measures.

DISCUSSION

Thus, the results of this study showed that performance on a classroom-administered power test is not affected by accentuating the competitive environment. In view of previous research which reported a marked increase in performance under competition, this study suggested that the effect of a competitive treatment is positively correlated with the degree to which the task is speed rather than power oriented.

The effect of competition may be a function of what, in reinforcement theory, is referred to as a deprivation-satiation factor: The greater the satiation, the less effective is reinforcement--the more intrinsically competitive the task, the less effective is superimposed competition.

This would require the assumption that a standardized achievement test is generally perceived as a more competitive activity than a simple mechanical task under typical classroom circumstances. For example, without superimposed competition, speed-type tasks (e.g., sharpening pencils, collecting papers, copying from the chalkboard) create a less competitive spirit than taking an achievement test. With this assumption and the speculation that there exists a linear relationship between the

effect of competition on performance and the degree to which a task is speed rather than power-oriented, it follows that the magnitude of the effect is positively related to the noncompetitiveness of the task.

The significant difference in the interest measure leads to a complementary speculation: The effectiveness of a competitive treatment on interest is inversely related to the degree to which the task is speed rather than power-oriented. There is, indeed, less support in the literature on which to base this speculation, but one might argue that speed-type tasks, within the classroom setting, are considered less of a "chore" and are thus relatively more appealing than activities which require problem solving. In this case the assumption is made that speed tasks are preferred to power tasks and thus, although they are mechanical and monotonous by objective standards, they are relatively more interest-arousing than power tasks in a classroom situation. In a typical fifth grade it would not be too surprising, for example, to find the majority of the students preferring a substitution, cancellation, or digit symbol task to a set of problems dealing with fractions or per cent.

In summary, a competitive treatment in a classroom power-testing situation was found to have virtually no effect on performance and a highly significant effect on interest. The speculation is made that the relative magnitude of the performance and interest effect is directly related to the nature of the task. That is, competition increases performance more in a speed task than in

a power task; and competition increases interest more in a power task than in a speed task.

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A E R A, 1970, MINNEAPOLIS, MINNESOTA

HAND OUT FOR

EFFECTS OF EMPHASIZING COMPETITION

IN CLASSROOM-TESTING PROCEDURES

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Subjects: 1,035 fifth and sixth grade students comprising 36 classrooms.

Measures:
1. School and College Ability Tests (SCAT, Series II, Forms 4A and 4B) were used for the performance (P) measure.
2. A single, 3-option item was used for the interest (I) measure.

Treatments:
1. Control (C)
2. Competition with Reward (R)
3. Competition with Game (G)

Results:

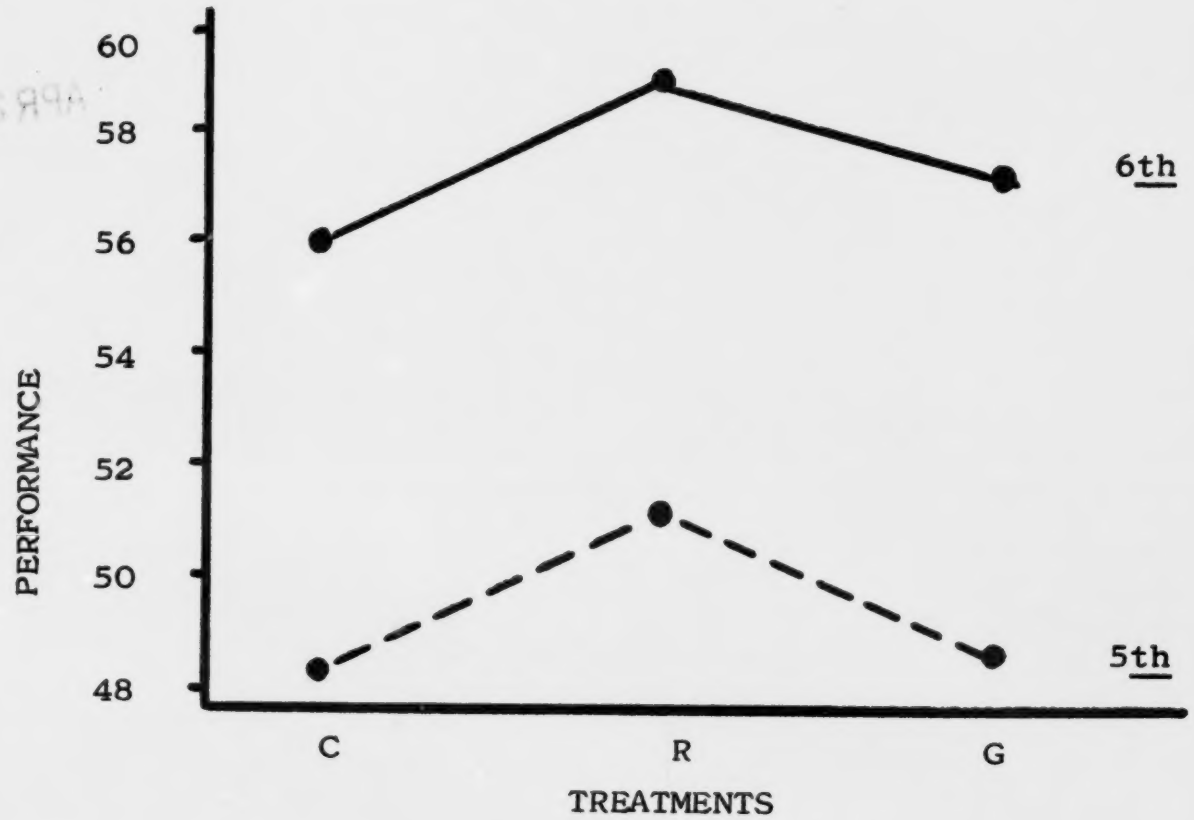

Fig. 1 Mean performance for 5th and 6th grades by treatments.

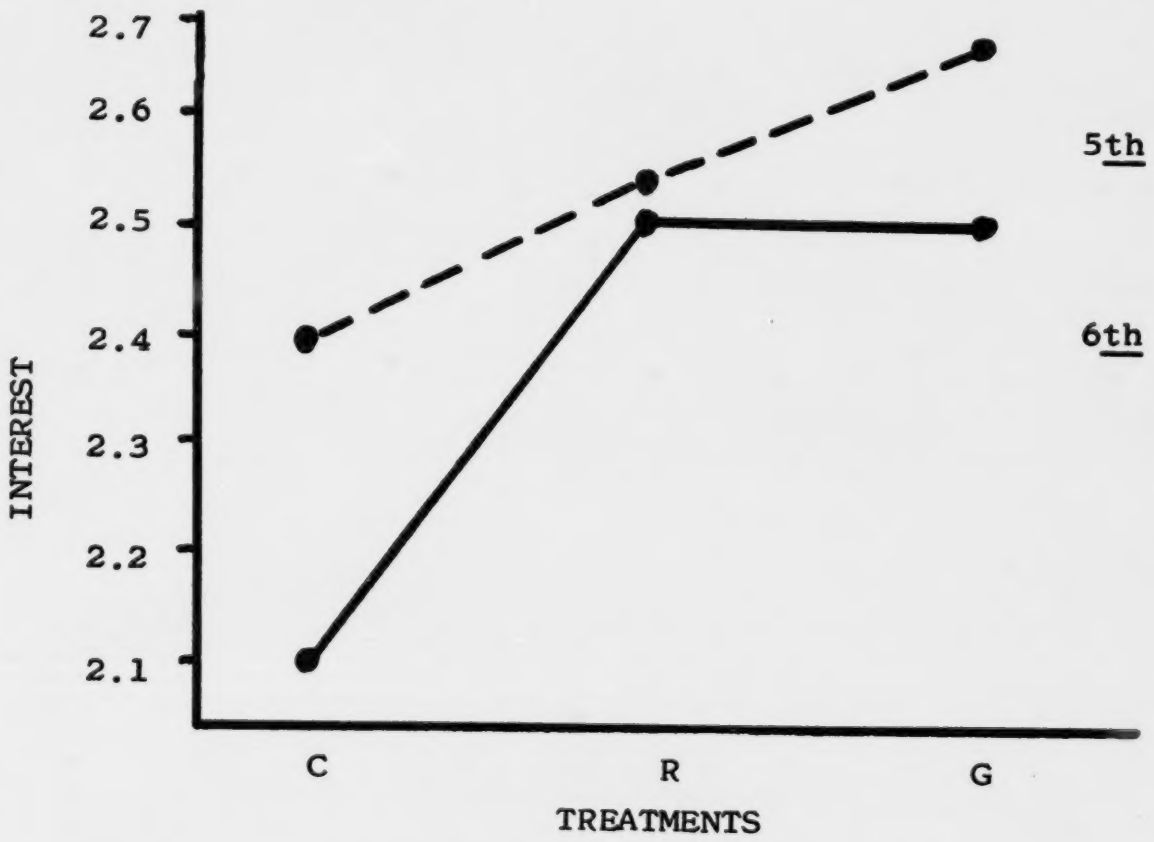

Fig. 2 Mean interest for 5th and 6th grades by treatments.